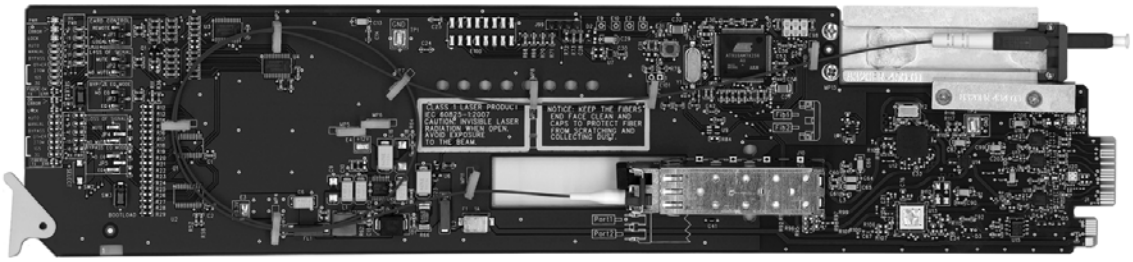
FSR-6601, FST-6602

Single Channel Optical Converters

User Manual



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FSR-6601, FST-6602 • Single Channel Optical Converters User Manual

- Sierra Video Part Number: **FSR-6601-OM**
- Document Revision: **1.0**
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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning — *The symbol with the word "**Warning**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Notice — *The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

Important Safety Instructions

Caution — *This product is intended to be a component product of the DFR-8300 series frame. Refer to the DFR-8300 series frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.*

Warning — *Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cards from the chassis' rear appliance connectors before servicing this area.*

Warning — *Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after any servicing.*
This product contains safety critical parts, which if incorrectly replaced may present a risk of fire or electrical shock. Components contained with the product's power supplies and power supply area, are not intended to be customer serviced and should be returned to the factory for repair. To reduce the risk of fire, replacement fuses must be the same time and rating. Only use attachments/accessories specified by the manufacturer.

EMC Notices

United States of America
FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice — *Changes or modifications to this equipment not expressly approved by Sierra Video Limited could void the user's authority to operate this equipment.*

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appariel numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the “Contact Us” section on the last page of this manual. All openGear products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the “Warranty and Repair Policy” section in this manual for details.

Important Laser Safety Measures and Notices

Before using this product and any associated equipment, refer to the sections below so as to avoid personnel injury and to prevent product damage. For further safety information when using fiber products, consult the following publications:

- ***IEC-60825- 2, Safety of Laser Products - Part 2: Safety of Optical Fiber Communication Systems (OFCS)*** (for use outside of the U.S.A.)
- ***ANSI Z136.2, Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources*** (for use in the U.S.A.)

Products may require specific equipment, and /or installation procedures be carried out to satisfy certain regulatory compliance requirements.

Caution — *Before operating or servicing this product, all personnel should be familiar with laser safety and fiber handling practices.*

Safety Measures for Operation

During normal operation of this product, heed the following safety measures:

- Do not stare at, or into, broken, or damaged, fibers.
- Do not stare at, or into, optical connectors.
- Only properly trained and authorized personnel should be permitted to perform laser/fiber optic operations.
- Ensure that appropriate labels are displayed in plain view and in close proximity to the optical port on the protective housing/access panel of the terminal equipment.

Safety Measures for Maintenance and Servicing

Warning — *Do not use optical equipment, such as a microscope or an eye loupe, to stare at the energized fiber end. Doing so may damage your eyes.*

During maintenance and servicing of this product, only properly trained and authorized personnel shall be allowed to use optical test or diagnostic equipment.

Laser Information

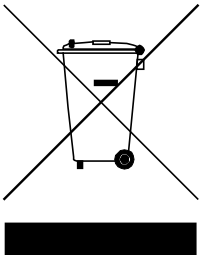
CLASS 1 LASER PRODUCT
IEC 60825-1:2007
Caution — *INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO THE BEAM.*

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Sierra Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration. You can also contact Sierra Video for more information on the environmental performances of our products.

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Introduction

In This Chapter

This chapter contains the following sections:

- Overview
- FSR-6601 Functional Block Diagrams
- FST-6602 Functional Block Diagrams
- Documentation Terms and Conventions

A Word of Thanks

Congratulations on choosing an openGear **FSR-6601** and **FST-6602 Single Channel Optical Converters** . Your FSR-6601 and FST-6602 are part of a full line of Digital Products within the openGear Terminal Equipment family of products, backed by Sierra Video's experience in engineering and design expertise.

You will be pleased at how easily your new FSR-6601 and FST-6602 fit into your overall working environment. Equally pleasing is the product quality, reliability and functionality. Thank you for joining the group of worldwide satisfied Sierra Video customers!

Should you have a question pertaining to the installation or operation of your FSR-6601 and/or FST-6602, please contact us at the numbers listed on the back cover of this manual. Our technical support staff is always available for consultation, training, or service.

Overview

The FSR-6601 and FST-6602 are capable of equalizing and reclocking all common serial digital signals. With support for both standard-definition and high-definition signals, the FSR-6601 and FST-6602 are the ideal universal SDI distribution amplifiers.

Both cards provide the ability to transport digital video baseband signals over a fiber optic link, allowing for longer transport distances. The electrical to optical (FST-6602) and optical to electrical (FSR-6601) conversions are done using video specific small form-factor pluggable (SFP) transceivers.

Both cards equalize the incoming SDI signal, then reclocks the signal with automatic rate detection for all popular data rates. LED indicators at the front of the card identify the presence of incoming video and the identified signal data rate.

In the DFR-8321 series frames, the FSR-6601 can be operated as a 1x6 using a Full Rear Module(8320AR-044) or operated as an independent 1x3 (one in, three out), using the Split Rear Module (8320AR-045). In the 1x3 configuration, the outputs are non-inverting, making it an excellent ASI distribution amplifier.

Features

The following features are standard for the FSR-6601 and FST-6602:

- Supports a wide variety of standards (SD, HD, and 3G SDI)
- Conforms to SMPTE 424M, SMPTE 292M, and SMPTE 259M
- Reclocking at 270Mbps, 1.483Gbps, 1.485Gbps, and 2.970Gbps
- FSR-6601 provides one fiber optic input and six SDI outputs using a Full Rear Module (8320AR-044)
- FST-6602 provides one SDI input, one fiber optic output, and five SDI outputs using a Full Rear Module (8320AR-044)
- LC/UPC Optical Connection
- Automatic detection of incoming data rate
- LED indicators for signal presence and data rate
- Reports status and configuration remotely via the DashBoard Control System™
- Fits DFR-8321 series frames
- High density with 20 cards per frame in the DFR-8321 series frames using Split Rear Modules (8320AR-045)
- Fully compliant with openGear specifications
- 5-year transferable warranty

FSR-6601 Functional Block Diagrams

This section provides a functional block diagrams that outlines the signal flow of the FSR-6601.

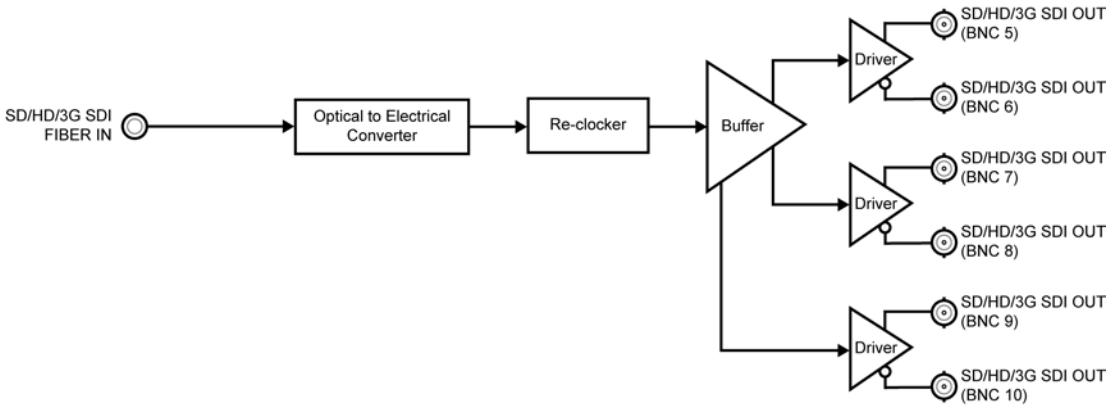

Figure 1.1 *FSR-6601 with a Full Rear Module — Simplified Block Diagram*

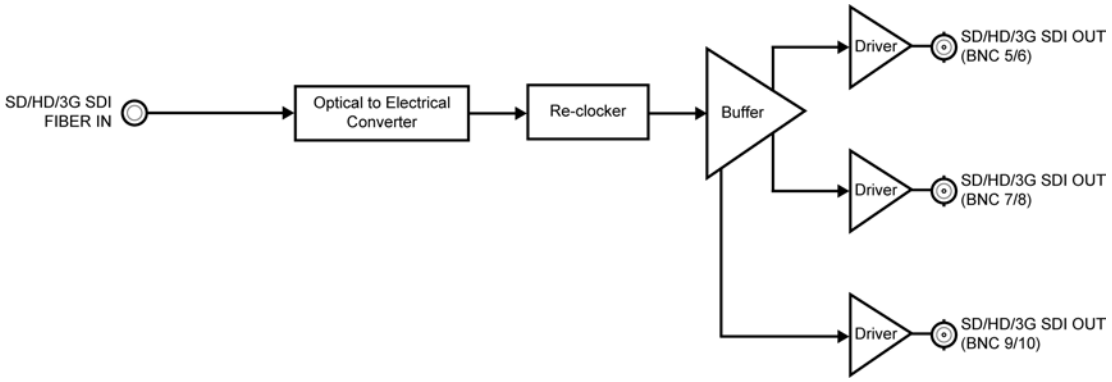

Figure 1.2 *FSR-6601 with a Split Rear Module — Simplified Block Diagram*

FST-6602 Functional Block Diagrams

This section provides a functional block diagrams that outlines the workflow of the FST-6602.

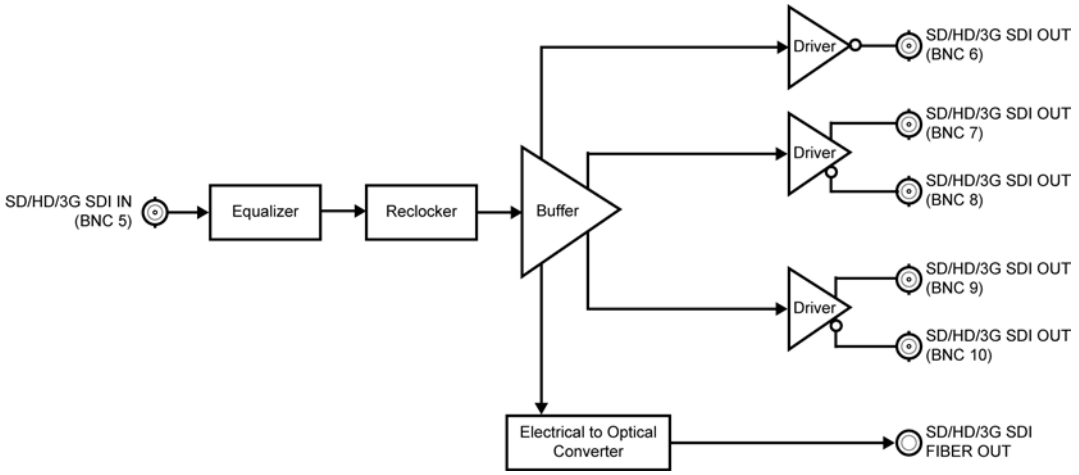

Figure 1.3 *FST-6602 Full Rear Module — Simplified Block Diagram*

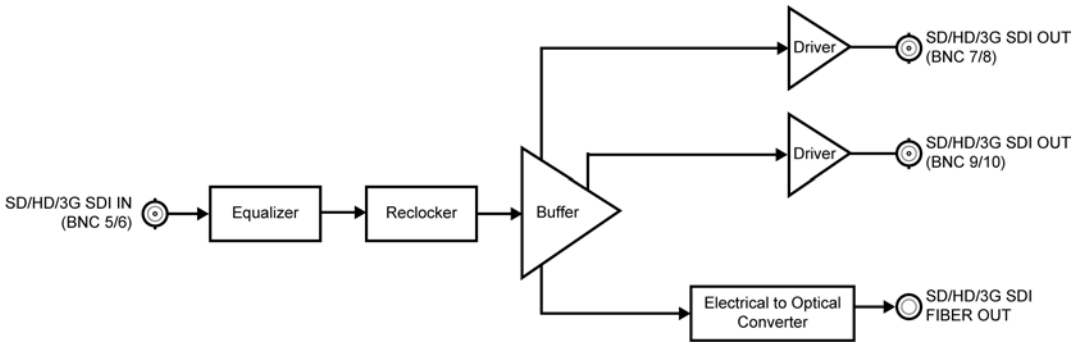

Figure 1.4 *FST-6602 Split Rear Module — Simplified Block Diagram*

Documentation Terms and Conventions

The following terms and conventions are used throughout this manual:

- "**Frame**" refers to DFR-8321 series frame that houses the FSR-6601 and FST-6602, as well as any openGear frames.
- All references to the **DFR-8321 series frame** also includes all versions of the DFR-8321 series frames and any available options unless otherwise noted.
- "**Operator**" and "**User**" refer to the person who uses FSR-6601 and FST-6602.
- "**Board**", and "**Card**" refer to openGear terminal devices within openGear frames, including all components and switches.
- "**System**" and "**Video system**" refer to the mix of interconnected production and terminal equipment in your environment.
- "**-line mode** " refers to broadcast situations using **NTSC** composite (analog) signal reference inputs.
- "**-line mode** " refers to broadcast situations using **PAL-B** composite (analog) signal reference inputs.
- "**PAL**" refers to PAL-B and PAL-G unless otherwise stated.
- The "**Operating Tips**" and "**Note**" boxes are used throughout this manual to provide additional user information.

Installation

In This Chapter

This chapter provides instructions for installing the Rear Module(s) for the FSR-6601 and FST-6602, installing the cards into the frame, cabling details, and updating the software.

The following topics are discussed:

- Before You Begin
- Installing the FSR-6601 and FST-6602
- Cabling for the FSR-6601 and FST-6602
- Software Upgrades for the FSR-6601 and FST-6602

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your DFR-8321 series frame is properly installed according to the instructions in the ***DFR-8300 Series User Manual***.

Static Discharge

Throughout this chapter, please heed the following cautionary note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each FSR-6601 and FST-6602 you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Sierra Video directly.

Working with Fiber Optic Connectors

Keep the following in mind when working with fiber optic connectors:

- Every time you are required to insert a connector into a device or mating sleeve, you must clean the connector. All exposed surfaces of the ceramic ferrule must be clean. Follow your facility practices of cleaning fiber optic connectors.
- Connectors must always be inserted into a device or have a dust cap on. Refer to **Figure 2.1** for dust cap locations.
- A poor optical connection is often similar to a poor electrical connection. Try removing the connector, cleaning, and re-inserting the connector. A bad connection can result in experiencing instability of signal, high loss, or a noisy signal.

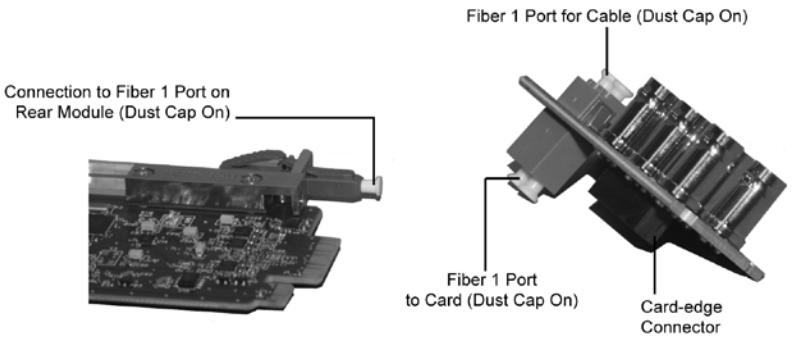
Fiber 1 Port for Cable (Dust Cap On)
Connection to Fiber 1 Port on
Rear Module (Dust Cap On)
Fiber 1 Port
to Card (Dust Cap On)
Card-edge
Connector

Figure 2.1 *Card Connectors with Dust Caps Installed — 8320AR-044 Rear Module Shown*

Installing the FSR-6601 and FST-6602

This section outlines how to install a Rear Module in a DFR-8321 series frame. However, the specific Rear Module you need to install depends on your application.

Caution — *Never attempt to look down the barrel of a connected fiber or device transmitting an optical signal. The transmitted light is not in the visible spectrum and may cause permanent eye damage. Turn off all laser sources before disconnecting devices.*

Rear Modules for the FSR-6601 and FST-6602

The Rear Module for the FSR-6601 and FST-6602 depends on the openGear frame you are installing the card into.

- **FSR-6601** — The **R2-6601** Full Rear Module (8320AR-044) or the **R2S-6601** Split Rear Module (8320AR-045) can be used. Note that the available cable designations differ between the type of module used. Refer to the section "**FSR-6601 Cabling Overview**" for details.
- **FST-6602** — The **R2-6602** Full Rear Module (8320AR-044) or the **R2S-6602** Split Rear Module (8320AR-045) can be used. Note that the available cable designations differ between the type of module used. Refer to the section "**FST-6602 Cabling Overview**" for details.

Installing a Rear Module

If the Rear Module is already installed, proceed to the section "**Installing the FSR-6601 and FST-6602**".

Use the following procedure to install a Rear Module in your DFR-8321 series frame:

1. Locate the card frame slots on the rear of the frame.
2. Remove the Blank Plate from the slot you have chosen for the FSR-6601 and FST-6602 installation. If there is no Blank Plate installed, proceed to the next step.
3. Remove the dust cap from the Fiber ports on the Rear Module that faces the interior of the frame. Refer to **Figure 2.1** and **Figure 2.2** for dust cap locations.

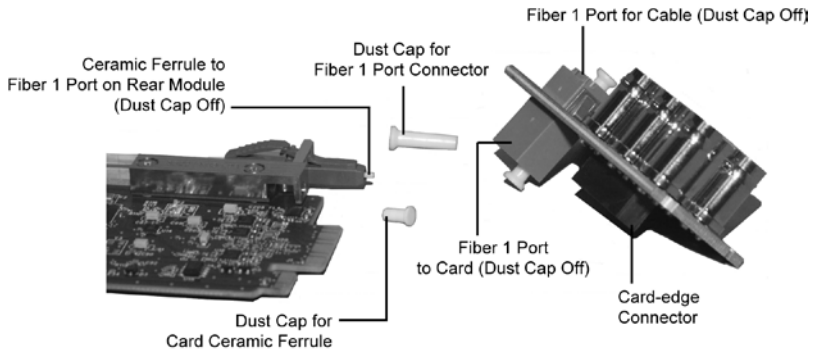

Figure 2.2 *Card Connectors Connectors with Dust Caps Removed — 8320AR-044 Rear Module Shown*

4. Install the bottom of the Rear Module in the **Module Seating Slot** at the base of the frame's back plane.

5. Align the top hole of the Rear Module with the screw on the top-edge of the frame back plane.

6. Using a Phillips screwdriver and the supplied screw, fasten the Rear Module to the back plane of the frame. Do not over tighten.

7. Ensure proper frame cooling and ventilation by having all rear frame slots covered with Rear Modules or Blank Plates.

This completes the procedure for installing a Rear Module in your DFR-8321 series frame.

Installing the FSR-6601 and FST-6602

Use the following procedure to install the FSR-6601 or FST-6602 in a DFR-8321 series frame:

1. Locate the Rear Module you installed in the procedure "**Installing a Rear Module**".

2. Ensure that the Rear Module is one of the required rear modules for the FSR-6601 or FST-6602. You must use either a Full Rear Module (8320AR-044) or a Split Rear Module (8320AR-045).

3. Remove the dust caps from the **Fiber 1** port connector on the card end.

   - Refer to **Figure 2.1** and **Figure 2.3** for connector location.
   - Refer to the section "**Important Laser Safety Measures and Notices**" at the beginning of this manual for safety information when handling fiber optic components.

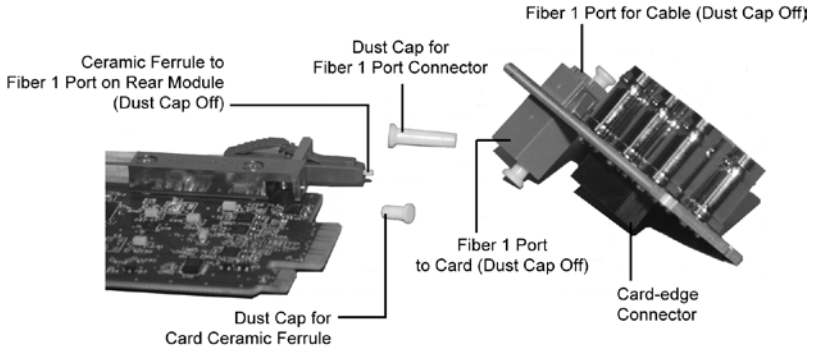

Figure 2.3 *Card Connectors with Dust Caps Removed — 8320AR-044 Rear Module Shown*

4. Ensure that the exposed surface of the ceramic ferrule of the connectors is clean. Refer to the section "**Working with Fiber Optic Connectors**" for cleaning tips.

5. Hold the card by the edges and carefully align the card-edges with the slots in the frame.

6. Fully insert the card into the frame until the rear connection plus is properly seated in the Rear Module. You will feel a click when the card mates onto the rear module.

7. Affix the supplied **Rear Module Label**, as per the included instructions, to the BNC area of the Rear Module.

8. Remove the dust cap from the **Fiber 1** port (the topmost fiber optic port) on the Rear Module that faces the exterior of the frame. This is the port that you will insert your Fiber optic cable into.

9. Ensure the ceramic ferrule of each connector is clean..

10. Cable your rear module as outlined in the section "**Cabling for the FSR-6601 and FST-6602**".

This completes the procedure for installing the FSR-6601 or FST-6602 in a DFR-8321 series frame.

Cabling for the FSR-6601 and FST-6602

This section provides information for connecting cables to the installed Rear Modules on the DFR-8321 series frames. Connect the input and output cables according to the following sections.

The optical connector used to mate the card to the rear module is designed for blind mate optical connections. All fiber interfaces are single mode fibers.

Notice — *Every time you are required to insert a connector into a device, or mating sleeve, you must clean the connector. All exposed surfaces of the ceramic ferrule must be clean. Follow your facility practices of cleaning fiber optic connectors.*

Connectors must always be inserted into a device or have a dust cap on.

FSR-6601 Cabling Overview

In the DFR-8321 series frames, the FSR-6601 is used with the following Rear Modules:

- **R2-6601** Full Rear Module (8320AR-044) — Each FSR-6601 occupies two slots and provides an optical input, and six SDI outputs. Refer to **Figure 2.5**.
- **R2S-6601** Split Rear Module (8320AR-045) — Each FSR-6601 occupies one slot and provides one optical input, and three SDI outputs. Refer to **Figure 2.6**.

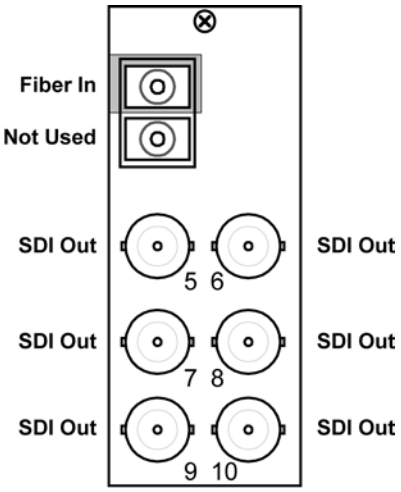

Figure 2.5 *Cable Connections for the **R2-6601** Rear Module*

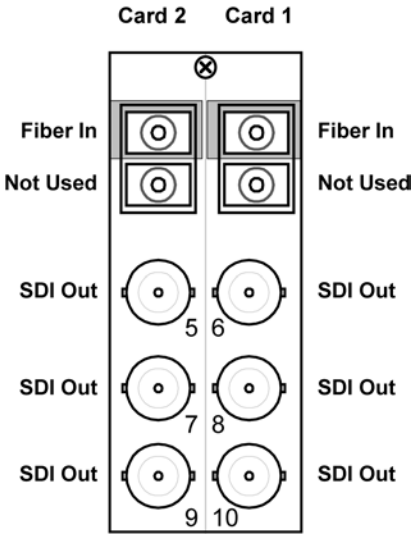

Figure 2.6 *Cable Connections for the **R2S-6601** Rear Module*

FST-6602 Cabling Overview

In the DFR-8321 series frames, the FST-6602 is used with the following Rear Modules:

- **R2-6602** Full Rear Module (8320AR-044) — Each FST-6602 occupies two slots and provides an optical output, an SDI input, and five SDI outputs. Refer to **Figure 2.7**.
- **R2S-6602** Split Rear Module (8320AR-045) — Each FST-6602 occupies one slot and provides one optical output, one SDI input, and two SDI outputs. Refer to **Figure 2.8**.

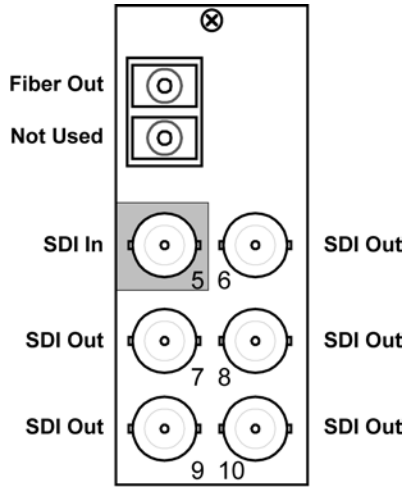

Figure 2.7 *Cable Connections for the **R2-6602** Rear Module*

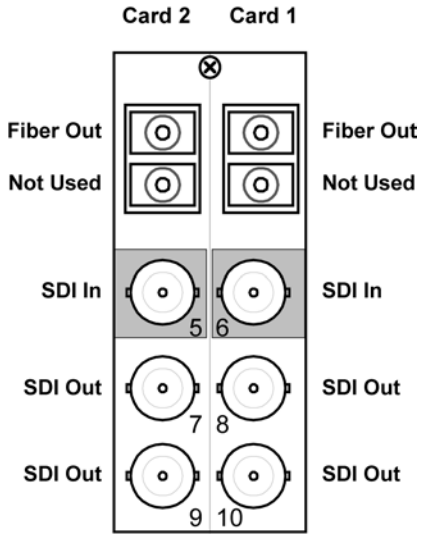

Figure 2.8 *Cable Connections for the **R2S-6602** Rear Module*

Software Upgrades for the FSR-6601 and FST-6602

This section provides instructions for installing a license key and upgrading the software for your FSR-6601 and FST-6602 using the DashBoard Control System™.

Use the following procedure to upload software to the FSR-6601 and FST-6602:

1. Contact Sierra Video Technical Support for the latest software version file.

2. In DashBoard, display the **Device** tab of the FSR-6601 and FST-6602 by double-clicking its status indicator in the **Basic Tree View**.

3. From the **Device** tab, click **Upload** to display the **Select File for upload** dialog box.

4. Navigate to the *.bin upload file you wish to upload. DashBoard automatically selects the last directory that you loaded from.

5. Click **Open** to display a confirmation dialog box. This dialog box displays the selected upload file name, type, size, and the file creation date.

6. From the **Confirmation** dialog box, select one of the following:

   - **Cancel** — Select this option to cancel the upload of the file and return to the **Device View**.
   - **Continue** — Select this option to upload the file. While uploading, an **Uploading Progress** dialog box opens.

Important — *Pressing the **Cancel** button while uploading will leave the card in an invalid state. Do not click **Cancel** unless the uploading progress has stopped completely for 60 seconds or more. If upload fails, repeat the upload process from DashBoard. If the upload process fails again, refer to the section "**Bootload Button**".*

7. Monitor the upgrade progress bar displayed in DashBoard while the software is upgraded on your FSR-6601 and FST-6602.

8. To complete the upgrade process, you must reboot the card as follows:

   - The reboot process takes up to 30 seconds.

Note — *The communications processor of the FSR-6601 and FST-6602 requires approximately 30 seconds to re-start and re-establish network communications.*

   - The FSR-6601 and FST-6602 automatically saves all your settings before starting the reboot process.
   - The reboot process is complete once the status indicators for the **Card State** and **Connection** return to their previous status.

This completes the procedure to upload software to the FSR-6601 and FST-6602.

User Controls

In This Chapter

This chapter provides a general overview of the user controls available on the FSR-6601 and FST-6602.

The following topics are discussed:

- Card Overview
- Control and Monitoring Features

Card Overview

This section provides a general overview of the FSR-6601 and FST-6602 components. For information on the LEDs available on the card-edge, refer to the section "**Control and Monitoring Features**".

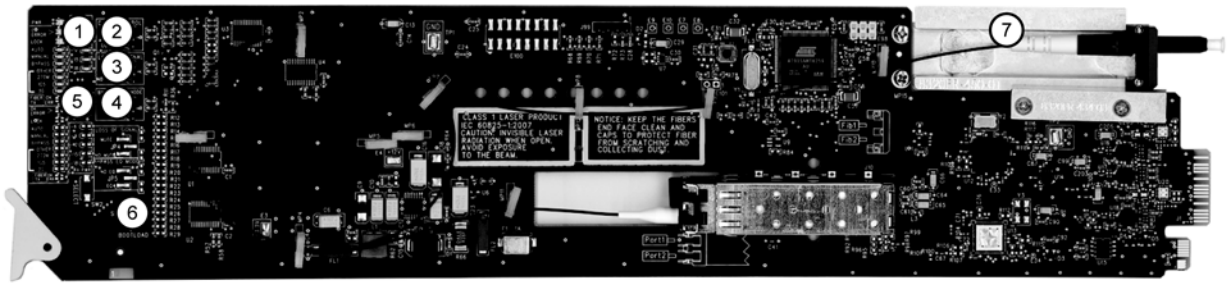

Figure 3.1 *FSR-6601 and FST-6602 — Components*

1) Rx Power LEDs - Channel A	5) Select Switch - Channel A (**SW1**)	9) Select Switch - Channel B (**SW2**)
2) Card Control (**JP1**)	6) Rx Power LEDs - Channel B	10) Bootload Button (**SW3**)
3) Loss of Signal - Channel A (**JP2**)	7) Loss of Signal - Channel B (**JP4**)	11) Fiber Optic Connector
4) Bypass EQ Mode - Channel A (**JP3**)	8) Bypass EQ Mode - Channel B (**JP5**)	

1. Rx Power LEDs

In this area of the FSR-6601, five LEDs are available to indicate the input optical power as detected by the optical module. Refer to the section "**Rx Power LEDs on the FSR-6601**" for details.

2. Error! Reference source not found.

Use **JP1** to select whether the card is remotely configured (for example, via DashBoard or SNMP). You can select one of the following options:

- **REMOTE** — This option enables the remote configuration. All parameters may be configured remotely. Data rate selection can also be configured locally using **SW1**, however, the jumper settings (**JP2** and **JP3**) are ignored.
- **LOCAL** — This option disables the remote configuration. The card can only be configured using the card-edge controls (**SW1**, **JP2**, and **JP3**). This option is useful to lock out remote configuration changes. This is the default setting.

Note — *The card status and configuration can still be monitored remotely when **JP1** is set to **LOCAL**.*

3. Error! Reference source not found.

Use **JP2** to determine the card behavior on a loss of input. Note that the **JP2** setting is only used when **JP1** is set to **LOCAL**. You can select one of the following options:

- **MUTE** — This option mutes the card outputs when the input equalizer is unable to detect a valid input signal, or when the reclocker is unable to lock to the input.
- **NO MUTE** — This option does not mute the card outputs on loss of input or lock. This is the default setting.

4. Error! Reference source not found.

   Use **JP3** to determine the equalizer behavior when the Reclocker Rate is set to **BYPASS** (using **SW1**). This jumper is only implemented for the FST-6602. You can select one of the following:

   - **EQ** — This option enables the input cable equalizer.
   - **NO EQ** — This option disables the equalizer when the Reclocker Rate is set to **BYPASS**. This option allows the card to pass signals that are outside the response band of the equalizer reclocking, such as 143MHz. This is useful for non-SMPTE data rates.

5. Error! Reference source not found.

   Use **SW1** to set the reclocking rate of the card. Pressing **SW1** cycles through the following options:

   - **AUTO** — This option enables automatic rate detection on the card. It will automatically lock to input at any supported data rate (270Mbps, 1.5Gbps, or 3Gbps).
   - **BYPASS** — This option enables the card to pass any data rate without reclocking. The output is set to the HD slew rate except when the input is a valid SD data rate (270Mbps).
   - **270M** — This option configures the card to reclock at a rate of 270Mbps (SD).
   - **1G5** — This configures the card to reclock at a rate of 1.5Gbps (HD).
   - **3G** — This configures the card to reclock at a rate of 3Gbps (HD).

6. Error! Reference source not found.

   SW3 is used for factory service in the unlikely event of a complete card failure. The Bootload process is further described in the section "**Bootload Button**".

7. Error! Reference source not found.

   The FSR-6601 and FST-6602 use a blind mate LC/UPC connector to interface with the Rear Modules (8320AR-044 and 8320AR-045). The rear module remains passive, while allowing for the FSR-6601 or FST-6602 to be replaced without the need to remove any connected BNC or fiber optic cables. The blind mate connector is connected to the optical module via a single mode LC/UPC pigtail.

   The fiber optic connector for the card includes a dust cap. The dust cap must stay on at all times when the card is not installed in a frame. Ensure to keep the fibers end face clean and use the caps to protect the fiber from scratches and collecting dust.

   For More Information...

   - on the LEDs available on the card-edge, refer to the section "**Control and Monitoring Features**".

- on the LED behavior when using the Reclocker Rate Selection feature, refer to the section "**Reclocker Rate Selection LEDs**".
- on the available DashBoard menus, refer to the section "**DashBoard Menus for the FSR-6601 and FST-6602**".
- on laser safety and important notices, refer to the section "**Important Laser Safety Measures and Notices**" at the beginning of this manual.
- on using fiber optic connectors, refer to the section "**Working with Fiber Optic Connectors**".

Control and Monitoring Features

This section provides information on the jumpers, buttons and LEDs for the FSR-6601 and FST-6602. Refer to **Figure 3.2** for the location of the LEDs. For information on the Rx Power LEDs, refer to the section "**Card Overview**".

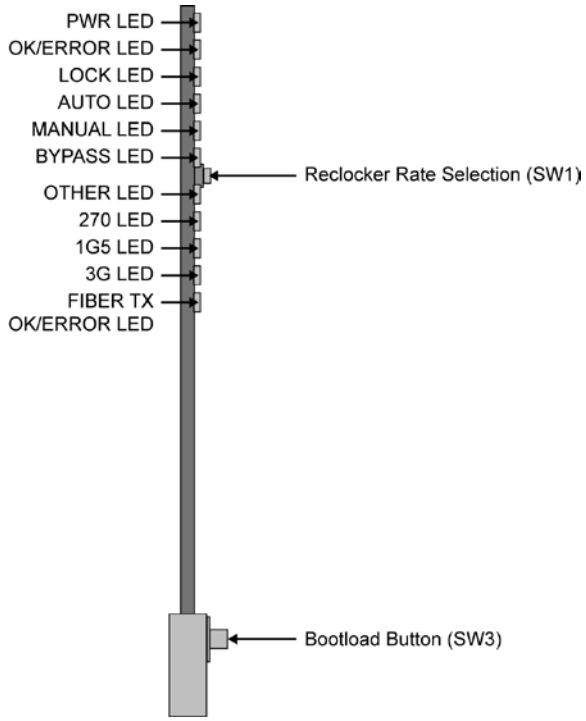

Figure 3.2 *FSR-6601 and FST-6602 Card-edge Controls*

Status and Selection LEDs on the FSR-6601 and FST-6602

The front-edge of the FSR-6601 and FST-6602 have LED indicators for alarms, and communication activity. Basic LED displays and descriptions are provided **Table 3.1**.

Table 3.1 LEDs on the FSR-6601 and FST-6602

LED	Color	Display and Description
PWR	Green	When lit green, this LED indicates that the card is functioning normal and that no anomalies have been detected.
	Flashing Green	When flashing green, this LED indicates that the bootloader is currently running.
	Yellow	When lit yellow, this LED indicates that the CPU is booting.
	Red	When lit red, this LED indicates that the card is powering on or there is a fault condition.
	Off	When unlit, this LED indicates a lack of power to the card.

LED	Color	Display and Description
OK/ERROR	Green	When lit, this LED indicates that a valid input signal is present.
	Red	When lit red, this LED indicates a valid input signal is not present.
LOCK	Green	When lit green, this LED indicates that the reclocker is locked to the input signal.
	Red	When lit red, this LED indicates that the reclocker is unable to lock to the input. This typically indicates that the input data rate is different from the configured reclocking rate, or that the input is an unsupported data rate.
	Off	When unlit, this LED indicates that the reclockers is set to Bypass.
AUTO	Yellow	When lit, this LED indicates that the reclocker is configured to lock to any supported input data rate, using an automatic rate detection scheme.
MANUAL	Yellow	When lit, this LED indicates that the reclocker is configured to a fixed data rate or to Bypass. When configured to a fixed data rate, automatic data rate detection is disabled.
BYPASS	Yellow	When lit, this LED indicates that the reclocker is manually configured to Bypass. The card output is not reclocked.
OTHER	Yellow	This LED is not implemented.
270	Yellow	When lit, this LED indicates that the reclocker is set to a fixed rate of 270Mbps (SD) or is configured in Auto mode and is locked to a 270Mbps SD signal.
1G5	Yellow	When lit, this LED indicates that the reclocker is set to a fixed rate of 1.5Gbps (HD), or is configured in Auto mode and is locked to a 1.5Gbps HD signal.
3G	Yellow	When lit, this LED indicates that the reclocker is set to a fixed rate of 3Gbps (HD), or is configured in Auto mode and is locked to a 3Gbps HD signal.
FIBER TX OK/ERROR*	Green	When lit green, this LED indicates that the Fiber Tx signal is functioning normal and that no anomalies have been detected.
	Red	When lit red, this LED indicates that there is a fault condition with the Fiber Tx signal.

*This LED only applies to the FST-6602.

Rx Power LEDs on the FSR-6601

Table 3.2 provides information on the Rx Power LEDs located on the FSR-6601. These LEDs indicate the input optical power as reported by the card optical module.

Table 3.2 Rx Power LEDs on the FSR-6601

Rx Power LEDs					Description
-6	-9	-12	-15	-18	
☼	☼	☼	☼	☼	The input optical power is greater than -6dBm
	☼	☼	☼	☼	The input optical power is between -6dBm and -9dBm
		☼	☼	☼	The input optical power is between -9dBm and -12dBm
			☼	☼	The input optical power is between -12dBm and -15dBm
				☼	The input optical power is between -15dBm and -18dBm
					The input optical power is less than -18dBm

☼ = Illuminated LED

Reclocker Rate Selection LEDs

Table 3.3 provides information on the **Reclocker Rate Selections** (**SW1** or **SW2**) and LED functions.

Table 3.3 Card Reclocker Rate Selection Button and LED Functions

Date Rate LED Displays						Description
AUTO	MANUAL	BYPASS	270M	1G5	3G	
☼						Auto mode, card searching for valid rate
☼			☼			Auto mode, card detects and reclocks rate of 270Mbps
☼				☼		Auto mode, card detects and reclocks rate of 1.5Gbps
☼					☼	Auto mode, card detects and reclocks rate of 3Gbps
	☼	☼				Card is configured for Bypass mode
	☼		☼			Card is set to reclock 270Mbps
	☼			☼		Card is set to reclock 1.5Gbps
	☼				☼	Card is set to reclock 3Gbps

Menus

In This Chapter

This chapter provides a summary of the menus available for the FSR-6601 and FST-6602.

The following topics are discussed:

- SNMP Monitoring and Control
- DashBoard Menus for the FSR-6601 and FST-6602

SNMP Monitoring and Control

The Network Controller Card in the DFR-8321 series frame provides optional support for remote monitoring of your frame and using the Simple Network Management Protocol (SNMP), which is compatible with many third-party monitoring and control tools.

Refer to your FSR-6601 and FST-6602 Management Information Base (MIB) files for a breakdown of SNMP controls on the cards. Refer to the ***MFC-8300 Series User Manual*** for additional information on SNMP Monitoring and Control.

DashBoard Menus for the FSR-6601 and FST-6602

The DashBoard Control System™ enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with other cards in the DFR-8321 series frame through the Network Controller Card. This section briefly summarizes the menus, items, and parameters available from the DashBoard Control System™ for the FSR-6601 and FST-6602. Default values are indicated with an asterisk (*).

Status Tab

Table 4.1 summarizes the **Status** tab parameters available in DashBoard. The **Status** tabs provide read-only information such as software revision issue, hardware status, and power consumption.

Table 4.1 Status Menu Functions

Menu	Item	Parameters	Description
Product (Read-only)	Product	FSR-6601 or FST-6602	
	Supplier	Sierra Video Ltd.	
	Board Rev	##	
	Board S/N	######	Indicates the card serial number
	Software Rev	##.##	Indicates the software version
Hardware (Read-only)	HW Status	OK	Indicates the status of the hardware including the SFP module. Some messages displayed are dependent on the settings in the **Alarms Enable** tab.
		FPGA load invalid	
		Incomp I/O Module	
		Current out of spec	
		Internal Error	
		SFP Temp Low	
		SFP Temp High	
		SFP Power High	
		SFP Power Low	
		SFP Tx Fault	
		SFP Not Detected	
	Voltage (mV)	#	Supply Voltage
	Current (mA)	#	Current consumption of card
	Rear Module	14.4	Indicates a Full Rear Module is installed

Menu	Item	Parameters	Description
Hardware (Read-only)		15.4	Indicates a Split Rear Module is installed
	Optical Module Temperature (C)	#	
	Optical Tx Wavelength (nm	#	Available for the FST-6602 only.
	CPU Headroom	#	Processing power available
	RAM Available	#/##	On-board processing memory available
	Uptime (h)	#	Displays the number of hours since the last reboot of the card
	Configuration Bank	#	Storage count
Signal (Read-only)	Channel Status	OK	Indicates when the channel is functioning normally or if anomalies are detected
		No Input	
		Reclocker unlocked	
		SFP Hi Temp	
		SFP Lo Temp	
		SFP Hi Power	
		SFP Tx Fault	
		SFP Not Detected	
	SDI Input	No Signal	Indicates when the SDI Input is present or if anomalies are detected
		Signal Present (BNC)	
		Signal Present (Fiber)	
	SDI Output	Locked - #	Indicates the status of the SDI Output
		Undefined Rate	
		Bypass Reclocking	
		No Signal	
		No Signal (muted)	
		Unlocked	
		Unlocked (muted)	
Signal (Read-	Optical Module Status	OK	Indicates the status of the card Optical Module
		No Signal	

Menu	Item	Parameters	Description
only)		Temp High	
		Temp Low	
		Rx Power High	
		Tx Power High	
		Rx Power Low	
		Tx Power Low	
		Tx Fault	
		Tx Disabled	
		Not Detected	
	Optical Rx Power (dBm)	#	Indicates the power consumption of the Optical Module. This value is accurate to ±3dB. (FSR-6601 only)
	Optical Tx Power (dBm)	#	Indicates the power consumption of the Optical Module. (FST-6602 only)

Setup Menus

Table 4.2 summarizes the **Setup Menu** options available in DashBoard.

Table 4.2 Setup Menu Items

Menu	Item	Parameters	Description
Setup	Reclock Rate	Auto	The card automatically detects the incoming data rate
		Bypass	The card does not reclock the input
		270 Mbps	The reclocker is set to 270Mbps
		1.5 Gbps	The reclocker is set to 1.5Gbps
		3 Gbps	The reclocker is set to 3Gbps
	Enable Equalizer	Checkbox is selected*	The equalizer is always enabled
		Checkbox is unselected	The equalizer is disabled when the card is in Bypass Mode
	Mute on Loss of Input	Checkbox is selected*	The output is muted on loss of input
		Checkbox is unselected	The output is not muted on loss of input
Setup	Edit Permission	Unlocked*	All configurable menu options are editable

Menu	Item	Parameters	Description
		Locked	All configuration menu options, except this one, are locked an are read-only
		Local Only	**JP1** is set to **LOCAL** and all configuration parameters, including this one, are locked and read-only
	Factory Defaults Reset	Reset	Resets all the settings

Alarms Menus

Table 4.3 summarizes the **Alarms Menu** options available in DashBoard.

Table 4.3 Alarms Menu Items

Menu	Item	Parameters	Description
Optical Module Alarms	Alarm on Abnormal Power	Checkbox is selected	HW Status field reports when the power consumption of the SFP module is not in range (high/low)
		Checkbox is unselected	Disables this alarm
	Alarm on Abnormal Temperature	Checkbox is selected	HW Status field reports when the temperature of the SFP module is not in range (high/low)
		Checkbox is unselected	Disables this alarm
Channel A	Alarm on Loss of Input	Checkbox is selected	Signal Status field reports a loss of input for the specified channel
		Checkbox is unselected	Disables this alarm

Specifications

In This Chapter

This chapter includes the technical specifications for the FSR-6601 and FST-6602. Note that specifications are subject to change without notice.

The following topics are discussed:

- FSR-6601 Technical Specifications
- FST-6602 Technical Specifications

FSR-6601 Technical Specifications

This section provides the technical specifications for the FSR-6601.

Table 5.1 FSR-6601 Technical Specifications

Category	Parameter	Specification
Optical Input	Number of Inputs	1
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M, SMPTE 424M
	Operating Wavelength Range	1210nm to 1600nm
	Input Power Operating Range (Color Bars)	-3dBm to -18dBm @ 2.97Gbps -3dBm to -19dBm @ 270Mbps and 1.5Gbps
	Input Power Operating Range (Pathological)	-3dBm to -17dBm @ 2.97Gbps -3dBm to -18dBm @ 270Mbps and 1.5Gbps
	Receiver Overload	At values above -3dB
	Connector Type	Single Mode, LC/UPC
SDI Outputs	Number of Outputs	Full Rear Module (8320AR-044): 6 Split Rear Module (8320AR-045): 3
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M, SMPTE 424M
	Impedance	75ohm
	Return Loss	>15dB to 1.485GHz >10dB from 1.485GHz to 2.97GHz
	Signal Level	800mV ±10%
	DC Offset	0Volts ±50mV
	Rise and Fall Time (20-80%)	700ps. Typical (270Mbps) 120ps. Typical (1.485Gbps, 2.97Gbps)
	Overshoot	<10%
	Connector Type	BNC
Environmental	Operating Range	0°C to 40°C
Power	Power Consumption	<4W

FST-6602 Technical Specifications

This section provides the technical specifications for the FST-6602.

Table 5.2 FST-6602 Technical Specifications

Category	Parameter	Specification
Optical Outputs	Number of Outputs	1
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M, SMPTE 424M
	Nominal Wavelength	1310nm
	Output Power	-7dBm to -2dBm
	Connector Type	Single Mode, LC/UPC
SDI Inputs	Number of Inputs	1
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M, SMPTE 424M
	Impedance	75ohm terminating
	Return Loss	>15dB to 1.485GHz >10dB from 1.485GHz to 2.97GHz
	Cable Length with Equalizer	> 300m of Belden 1694A cable @ 270Mbps > 120m of Belden 1694A cable @ 1.485Gbps > 80m of Belden 1694A cable @ 2.97Gbps
	Connector Type	BNC
SDI Outputs	Number of Outputs	Full Rear Module (8320AR-044): 5 Split Rear Module (8320AR-045): 2
	SMPTE Standards Accommodated	SMPTE 259M-C, SMPTE 292M, SMPTE 424M
	Impedance	75ohm
	Return Loss	>15dB to 1.485GHz >10dB 1.485GHz to 2.97GHz
	Signal Level	800mV ±10%
	DC Offset	0V ±50mV
	Rise and Fall Time (20-80%)	700ps. Typical (270Mbps) 120ps. Typical (1.485Gbps, 2.97Gbps)
	Overshoot	<10%
	Connector Type	BNC
Environment	Operating Range	0°C to 40°C

Category	Parameter	Specification
Power	Power Consumption	<4W

Service Information

In This Chapter

This chapter contains the following sections:

- Troubleshooting Checklist
- Warranty and Repair Policy

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your FSR-6601 or FST-6602, the following basic troubleshooting checklist may help identify the source of the problem. If the module still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Sierra Video Technical Support department at the numbers listed under the "**Contact Us**" section at the end of this manual.

1. **Visual Review –** Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the module, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check –** Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Reseat the Card in the Frame** – Eject the card and reinsert it in the frame.
4. **Check Control Settings –** Refer to the Installation and Operation sections of the manual and verify all user-adjustable component settings.
5. **Input Signal Status –** Verify that source equipment is operating correctly and that a valid signal is being supplied.
6. **Output Signal Path –** Verify that destination equipment is operating correctly and receiving a valid signal.
7. **Card Exchange** – Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Bootload Button

In the unlikely event of a complete card failure, you may be instructed by a Sierra Video Technical Support specialist to perform a complete software reload on the FSR-6601 or FST-6602.

Use the following procedure to perform a software reload on the FSR-6601 or FST-6602:

1. Eject the card.
2. Press and hold the **Bootload** button, while re-inserting the card into the frame.
3. Release the button.

   The **PWR LED** will flash GREEN while the card is waiting for a new software load.

   If a new software load is not sent to the card within 60 seconds, the card will attempt to restart with the last operational software load.

Software can be uploaded to the FSR-6601 or FST-6602 via DashBoard. Refer to your ***DashBoard Control System Software User Manual*** for further instructions.

Warranty and Repair Policy

The FSR-6601 or FST-6602 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your FSR-6601 or FST-6602 proves to be defective in any way during this warranty period, Sierra Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this FSR-6601 or FST-6602 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Sierra Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This User Manual provides all pertinent information for the safe installation and operation of your FSR-6601 or FST-6602. Sierra Video policy dictates that all repairs to the FSR-6601 or FST-6602 are to be conducted only by an authorized Sierra Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Sierra Video Limited factory representative, will automatically void the warranty. Please contact Sierra Video Technical Support for more information.

In Case of Problems

Should any problem arise with your FSR-6601 or FST-6602, please contact the Sierra Video Technical Support Department. Contact information is supplied at the end of this publication.

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your FSR-6601 or FST-6602. If required, a temporary replacement module will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Sierra Video Limited will be shipped collect.

The Sierra Video Technical Support Department will continue to provide advice on any product manufactured by Sierra Video Limited, beyond the warranty period without charge, for the life of the equipment.

Contact Us

Contact Sierra Video Systems.

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	Fax	530.478.1105
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